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ABSTRACT

A study investigated the hypothesis that mental imagery facilitates access to prior knowledge and therefore enhances the ability to infer and make text-relevant predictions. The subjects, 29 first grade and 29 third grade students, were randomly assigned to either an experimental group where they were instructed to make pictures in their head to help them remember the story as they read, or a control group where they were told simply to think about what they were reading to help them remember. A short story, which was written at first grade and third grade readability levels, was divided into five sections at points in the story where predictions about forthcoming events could be made and used as stimuli. Immediately following the silent reading of each of the five sections of the story, the subjects responded to a prediction question. The recorded responses were scored for reference to explicit facts, prediction statements, and accuracy of prediction. The results supported the hypothesis that induced mental imagery enhances the ability to infer and make text predictions for third grade students, but not for the younger subjects. (HTH)

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INDUCED MENTAL IMAGERY AND THE TEXT PREDICTION
PERFORMANCE OF FIRST AND THIRD GRADERS

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It is generally agreed that mental imagery has a complex relationship to cognition and language (Hebb, 1966; Piaget & Inhelder, 1971). The positive effects of induced mental imagery have been carefully documented for paired associate learning (Paivio & Yuille, 1967; Wolff & Levin, 1972; Pressley, 1976) and for listening comprehension (Shimron, 1975; Guttman, Levin & Pressley, 1977). While recent research has suggested that induced mental imagery facilitates reading comprehension (Pressley, 1976; Steingart & Glock, 1979; Linden & Wittrock, 1981) the value of using imagery as a strategy for enhancing

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reading comprehension has yet to be thoroughly explored (Tierney & Cunningham, in press).

The primary hypothesis set forth in this study was that mental imagery facilitates access to prior knowledge and therefore enhances the ability to infer and make text relevant predictions. The ability to anticipate and make predictions based upon text information appears to be associated with efficient learning (Smith, 1978). Good readers predict more frequently (Olshavsky, 1976-77) and more accurately than poor readers (Olshavsky & Knelzing, 1978). The research of Kail, Chi, Ingraham and Danner (1977) strongly suggests that the ability to infer and predict improves with age and is dependent upon the ability to access and manipulate information from memory. In the present study induced mental imagery was investigated as a strategy for accessing prior knowledge in order to facilitate text relevant predictions.

Method

Subjects

Twenty-nine first graders and 29 third graders enrolled in two suburban Maryland public schools served as subjects in the study. The first graders were judged to be reading proficiently at the first grade level by their classroom teachers. Metropolitan Reading Readiness Scores ranged from 44 to 99 with a mean of 73.509. The criteria for inclusion in the study for third graders were: (1) reading comprehension scores obtained from the California Achievement Test of at least 2.0 grade level,

(2) Cognitive Abilities Test scores between the 15th and 90th percentile, and (3) teacher verification of reading ability at or above the 2nd grade level.

Materials

The stimulus materials used in this study consisted of a short story which was written at a first grade and a third grade readability level (Fry, 1977). The first grade story (approximately 200 words) and the third grade story (approximately 235 words) contained the same number of major propositions. The events and story information were consistent across the two versions of the story.

The story was divided into five sections based upon prediction points (logical points in the story where predictions about forthcoming events could be made). Following each section of the story a prediction question was posed: "What do you think is going to happen next in the story?" One probe, "Anything else?" was allowed.

Procedure

Subjects were randomly assigned, by grade level, to either the experimental or control group. The subjects met individually with the investigator for approximately 30 minutes. All subjects were told that they would be reading a story and answering some questions about an animal called a "monfur". In the experimental group subjects were given instructions to "Make pictures in your head about what you read to help you remember..." prior to reading each of the five sections of the

story. In the control group subjects were given instructions to "Think about what you read to help you remember...".

Immediately following the silent reading of each of the five sections of the story subjects were asked, "What do you think is going to happen next?" All responses were tape recorded. All subjects read the entire story and responded to a total of five prediction questions.

Results

Responses to the prediction questions were transcribed for analysis. Two raters scored the responses for thirty percent of the subjects which resulted in an interrater reliability of .90. One rater scored the remainder of the data. The raters were unaware of whether the responses were made by the subjects from the experimental or control group.

The responses to the prediction questions were scored for: (1) reference to facts which were explicitly stated in the text, (2) prediction statements, and (3) accuracy of prediction statements. Data on the number of facts and predictions for first and third grade subjects were analyzed using analysis of variance procedures. Only three instances of inappropriate predictions were noted, all occurring at the first grade level, therefore, accuracy of prediction was not included in the final analysis.

Mean number of facts and mean number of prediction statements constituted the dependent variables in this study.

Table 1 presents the means for the first grade subjects and Table 2 presents the means for third grade subjects in the imagery and no imagery groups. Preliminary inspection of the data revealed no appreciable sex differences for first and third grade subjects. Data were combined for males and females in the subsequent analyses.

Insert Table 1 about here

Insert Table 2 about here

In the analysis of variance no statistically significant differences were found for first grade subjects on number of facts, $F(1, 27) = 1.11, p > .05$, or number of predictions, $F(1, 27) = .27, p > .05$. For the third grade subjects statistically significant differences in favor of the induced mental imagery group were found on both number of facts, $F(1, 27) = 9.31, p < .005$, and number of predictions, $F(1, 27) = 9.17, p < .005$.

Discussion

The findings of this study provide support for Pressley's (1976) conclusion that induced mental imagery facilitates reading comprehension for children of third grade and above. Pressley's (1976) results, and the results of this study, indicate that induced mental imagery does not enhance reading

reading comprehension for beginning readers. We know, however, from the work of Kosslyn (1976) and Levin and Divine-Hawkins (1974) that induced mental imagery appears to facilitate listening comprehension for children as young as first grade. Kosslyn's (1976) research further suggests that younger children rely more on imagery in memory retrieval of orally presented information than do older children.

Several rival hypotheses can be entertained to explain the discrepancy between the effects of induced mental imagery for first and third graders in this study. The findings may reflect an age/experience effect with respect to mental imagery under reading conditions. Another, perhaps more obvious explanation, is that proficient readers benefit from induced mental imagery while, for younger, less proficient readers inducing mental imagery adds an additional processing burden (processing mental images and print simultaneously). An inspection of the means for the first graders in the imagery and non-imagery groups suggests, however, that there were no detrimental effects from instructions to induced mental imagery.

The results of this study support the hypothesis that induced mental imagery facilitates access to prior knowledge and therefore enhances the ability to infer and make text relevant predictions for third graders. This hypothesis was based on three assumptions: first, that the use of mental imagery facilitates interaction between the reader and the text; second, that the use of mental imagery facilitates access to text relevant prior knowledge; third, that induced mental

imagery is more effective than spontaneous imagery.

The magnitude of the effect of induced mental imagery upon the recall of facts stated in the story and the generation of text relevant predictions for third grade subjects in this study is of particular interest. These findings strongly suggest that reader-text interaction is enhanced by induced mental imagery. Other studies investigating the effects of mental imagery on reading comprehension have generally reported statistical differences of such low magnitude that they are of questionable educational value (Pressley, 1976). Previous research on reading and mental imagery has focused on subject's responses to literal and, to a lesser extent, inferential questions. In this study subjects responded to open-ended prediction questions. While the speculation is tentative, it may be that imagery facilitates language elaboration and that open-ended prediction questions are more sensitive to the effects of induced mental imagery than more focused cued recall questions.

In this study the findings for third grade subjects suggest that they were highly sensitive to instructions to induce mental imagery about what they read. While there is evidence to suggest that some children spontaneously image (Kosslyn, 1976; Olshavsky, 1976-77) the results of this study support the contention that induced mental imagery is more effective than spontaneous imagery for third graders.

Clearly, a great deal of additional research must be done before we can hope to adequately understand the role of

induced mental imagery in the reading comprehension process. However, it does appear that Kosslyn's (1976) hypothesis that young children use mental imagery to access semantic information in listening situations can be extended to reading situations for third graders. The third grade subjects in this study showed a remarkable ability to infer and make text relevant predictions when given instructions to induce mental imagery.

Table 1
Means and Standard Deviations for First Graders

	Imagery (N=16)		No Imagery (N=13)	
	$\bar{M}$	S.D.	$\bar{M}$	S.D.
Facts	6.500	2.921	5.307	3.172
Predictions	4.000	3.204	3.384	3.150

Table 2
Means and Standard Deviations for Third Graders

	Imagery (N=14)		No Imagery (N=15)	
	$\bar{M}$	S.D.	$\bar{M}$	S.D.
Facts*	12.714	7.021	6.533	3.398
Predictions*	9.928	6.293	4.533	2.748

*significant at the .005 level of significance

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